

IN THE CLAIMS

1. (Currently amended) A urethane acrylate gel coat resin comprising reaction products of a reaction mixture comprising

(a) ~~an~~ a partially branched aliphatic hydroxy-terminated oligoester having weight average molecular weight of about 200 to about 4000, wherein the partially branched oligoester is a reaction product of

(i) one or more saturated diols;

(ii) one or more saturated triols or polyols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof,

wherein the oligoester comprises up to 5 mole % of the one or more saturated triols or polyols;

(b) a diisocyanate; and

(c) a hydroxyalkyl (meth)acrylate,

wherein the reaction mixture is formed by adding the diisocyanate to a blend of the oligoester and hydroxyalkyl(meth)acrylate.

2. (Currently amended) The gel coat resin of claim 1 comprising a compound having a structure



wherein A is the oligoester, B is the diisocyanate, and C is the hydroxyalkyl (meth)acrylate.

3. (Original) The resin of claim 1 wherein the oligoester is saturated or unsaturated and has a weight average molecular weight of about 500 to about 3000.

4. (Cancelled)

5. (Currently amended) The gel coat resin of claim 4~~1~~ wherein the diol and triol are selected from the group consisting of 1,6-hexanediol, neopentyl glycol, glycerol, trimethylolpropane, 1,3-butylene glycol, 1,4-butylene glycol, cyclohexanedimethanol, ethylene glycol, propylene glycol, pinacol, pentanediol, 2,2-dimethyl-1,3-propanediol, a polyethylene or polypropylene glycol having a weight average molecular weight of about 500 or less, and mixtures thereof.

6. (Original) The gel coat resin of claim 5 wherein the dicarboxylic acid is selected from the group consisting of adipic acid, maleic acid, malonic acid, cyclohexanedicarboxylic acid, sebacic acid, azelaic acid, succinic acid, glutaric acid, pimelic acid, suberic acid, chlorosuccinic acid, maleic acid, dihydroxymaleic acid, diglycollic acid, oxalacetic acid, oxalic acid, pimelic acid, suberic acid, chlorosuccinic acid, mesoxalic acid, acetone dicarboxylic acid, dimethyl malonic acid, 1,2-cyclopropanedicarboxylic acid, cyclobutane-1,1-dicarboxylic acid, cyclobutane-1,2-dicarboxylic acid, cyclobutane-1,3-dicarboxylic acid, cyclopentane-1,1-dicarboxylic acid, cyclopentane-1,2-dicarboxylic acid, 2,5-dimethylcyclopentane-1,1-dicarboxylic acid, alpha,alpha'-di-sec-butylglutaric acid, beta-methyl-adipic acid, isopropyl-succinic acid, and 1,1-dimethyl-succinic acid, anhydrides thereof, and mixtures thereof.

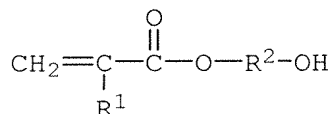
7. (Original) The gel coat resin of claim 1 wherein a reaction mixture of (a), (b), and (c) contains a molar ratio of about 0.75 to about 1.25 mole (a) to about 1.5 to about 2.5 moles (b) to about 1.5 to about 2.5 moles (c).

8. (Original) The gel coat resin of claim 1 wherein the diisocyanate comprises (a) an aliphatic diisocyanate and (b) up to 20% of an aromatic diisocyanate, by total weight of the diisocyanate.

9. (Original) The gel coat resin of claim 8 wherein the aliphatic diisocyanate is selected from the group consisting of 1,6-hexamethylene diisocyanate, isophorone diisocyanate, 1,4-cyclohexane diisocyanate, 2,4'-dicyclohexylmethane diisocyanate, 4,4'-dicyclohexylmethane diisocyanate, 1,3-bis(isocyanatomethyl)cyclohexane, 1,4-bis(isocyanatomethyl)cyclohexane, tetramethylxylene diisocyanate, 1,11-diisocyanatoundecane, 1,12-diisocyanatododecane, 2,2,4-trimethyl-1,6-diisocyanatohexane, 2,4,4-trimethyl-1,6-diisocyanatohexane, 1,2-bis(isocyanatomethyl)cyclobutane, hexahydro-2,4-diisocyanatotoluene, hexahydro-2,6-diisocyanatotoluene, 1-isocyanato-2-isocyanatomethyl cyclopentane, 1-isocyanato-3-isocyanatomethyl-3,5,5-trimethyl cyclohexane, 1-isocyanato-4-isocyanatomethyl-1-methyl cyclohexane, 1-isocyanato-3-isocyanatomethyl-1-methyl cyclohexane, and mixtures thereof.

10. (Original) The gel coat resin of claim 9 comprising 0% to about 20%, by total weight of the diisocyanate, of an aromatic diisocyanate selected from the group consisting of toluene 2,4-diisocyanate, toluene 2,6-diisocyanate, 4,4'-methylenediphenyl diisocyanate, 2,4'-methylene diphenyl diisocyanate, polymeric methylene diphenyl diisocyanate, p-phenylene diisocyanate, naphthalene-1,5-diisocyanate, and mixtures thereof.

11. (Original) The gel coat resin of claim 1 wherein the hydroxyalkyl (methyl)acrylate has a structure



wherein R¹ is hydrogen or methyl and R² is a C₁ to C₆ alkylene group or an arylene group.

12. (Original) The gel coat resin of claim 1 wherein the hydroxyalkyl (meth)acrylate is selected from the group consisting of 2-hydroxyethyl methacrylate, 2-hydroxyethyl acrylate, 2-hydroxypropyl methacrylate, 3-hydroxypropyl methacrylate, and mixtures thereof.

13. (Original) The gel coat resin of claim 1 wherein the oligoester comprises a reaction of product of (a) neopentyl glycol, 1,6-hexanediol, or a mixture thereof, and (b) adipic acid.

14. (Original) The gel coat resin of claim 13 wherein the diisocyanate comprises isophorone diisocyanate.

15. (Original) The gel coat resin of claim 14 wherein the hydroxyalkyl (meth)acrylate comprises 2-hydroxyethyl acrylate.

16. (Original) A gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

17. (Original) The gel coat composition of claim 16 wherein the gel coat resin is present in the composition in an amount of about 25% to about 50%, by weight, of the composition.

18. (Original) The gel coat composition of claim 16 further comprising a pigment paste, a free radical initiator, or a mixture thereof.

19. (Original) A gel coat prepared by curing a gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

20. (Original) The gel coat of claim 19 wherein the gel coat is prepared by a free radical polymerization.

21. (Original) An article of manufacture having an exterior gel coat prepared by curing a gel coat composition comprising a urethane acrylate gel coat resin of claim 1.

22. (Currently amended) A method of preparing a urethane acrylate gel coat resin comprising the steps of

(a) preparing a partially branched hydroxy-terminated oligoester having a weight average molecular weight of about 200 to about 4000 by reacting ~~(i) a saturated diol and optional saturated triol with (ii) a saturated or aliphatic unsaturated dicarboxylic acid, a saturated or aliphatic unsaturated dicarboxylic acid anhydride, or a mixture thereof, in sufficient relative amounts of (i) and (ii) to provide terminal hydroxy groups~~

(i) one or more saturated diols;

(ii) one or more saturated triols or polyols, and

(iii) one or more saturated dicarboxylic acids, or one or more aliphatic unsaturated dicarboxylic acids, or one or more saturated dicarboxylic acid anhydrides, or one or more aliphatic unsaturated dicarboxylic acid anhydrides, or mixtures thereof,

wherein the oligoester comprises up to 5 mole % of the one or more saturated triol or polyol;

(b) adding a hydroxyalkyl (meth)acrylate to the oligoester of step (a) to form a prereaction mixture;

(c) then adding a diisocyanate to the prereaction mixture of step (b) to form a reaction mixture; and

(d) maintaining the reaction mixture of step (c) at a sufficient temperature for a sufficient time such that equivalents of free isocyanate groups are present at less than 0.3% ~~and~~ of the isocyanate groups added in step (c) to yield the urethane acrylate gel coat resin.

23. (Currently amended) The method of claim 22 wherein the gel coat resin has an acrylate group positioned at ~~each terminal end~~ ends of the resin.

24. (Original) The method of claim 23 wherein the gel coat resin is prepared using a molar ratio of (I) oligoester to (II) diisocyanate to (III) hydroxyalkyl (meth)acrylate of about 0.9 to about 1.1 (I) to about 1.5 to about 2.2 (II) to about 1.5 to about 2.2 (III).

25. (Original) The method of claim 23 wherein the gel coat resin is prepared using a mole ratio of oligoester to diisocyanate to hydroxyalkyl (meth)acrylate of 1:1.7-2:1.7-2, respectively.